MOBILE HOMES IN ONTARIO

CONSTRUCTION AND COSTS

Ontario

MINISTRY OF TREASURY, ECONOMICS AND INTERGOVERNMENTAL AFFAIRS

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SUMMARY BASED ON A REPORT
BY PETER BARNARD ASSOCIATES
for the
MINISTRY OF TREASURY, ECONOMICS
AND INTERGOVERNMENTAL AFFAIRS

1973

PURPOSE

Mobile homes are controversial! They are promoted as a panacea and attacked as substandard housing; cherished by their owners and spurned by their neighbours; welcomed in some municipalities and banned in others. Surprisingly, the controversy turns around a form of housing that accounts for only a small fraction of the Ontario housing supply.

There are indications that the use of mobile homes as permanent dwellings has been increasing in Canada. The situation, however, differs from province to province. Figures from *Statistics Canada* indicate that less than 1,700 Canadian-manufactured mobile homes were shipped to Ontario destinations in 1971. This is equivalent to only about two percent of total dwelling completions in the province that year. Obviously, it was not the extent of mobile home use that suggested the need for research. Rather, it was the fact that these homes are unique in many ways.

Under *The Planning Act*, the Ministry of Treasury, Economics and Intergovernmental Affairs is obliged to scrutinize municipal proposals for official plans. In addition to requiring our own evaluation criteria, a principal objective of our mobile home research study is to provide guidelines to help the municipality in adopting sound development policies for its official plan and in considering zoning and subdivision applications.

Our comprehensive mobile home study has many segments. These include consideration of such community planning factors as the distribution of mobile homes in Ontario; characteristics of mobile home parks; socio-economic characteristics of mobile home owners; design principles for mobile home parks; and legislation and regulations.

This report on *Mobile Homes in Ontario: Construction and Costs* deals with an important segment of that study. Unlike most other forms of housing, mobile homes have been used too little and for too short a time to have provided a general knowledge of their durability. But, analysis of Ontario experience can be used to supplement technical consideration of the structural aspects of mobile homes to produce a better understanding of this type of dwelling.

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SCOPE

Peter Barnard Associates of Toronto was commissioned to undertake research on the physical life expectancy and maintenance aspects of mobile homes in Ontario. Their report offers a technical examination of the subject, based on 1971 data.

Some practical limitations on the scope of the study are explained below.

The research relates to mobile homes only -- not to travel trailers. The distinction is drawn largely on the basis of permanent versus seasonal occupancy. The mobile home is occupied as a permanent residence while the travel trailer is used for short periods, usually for recreation purposes.

Mobile homes are the only type of manufactured dwelling units included in the study. Modular units, for example, are excluded. The reason is that they differ from mobile homes in two important ways. First, modules are not transported on their own running gear. Second, mobile homes retain greater potential mobility after they are sited.

Since the physical life of a building cannot be expressed in absolute terms, a comparative approach is used. The mobile home is compared with a conventional house, more specifically with a single-family detached, single-storey bungalow.

The study concentrates on mobile home models currently being manufactured in Ontario in accordance with recently introduced standards of construction, as these models seem likely to form the bulk of mobile homes in the province in the foreseeable future.

The cost analysis is limited to current purchase and siting costs of a mobile home and to selected costs directly related to its construction, such as cost of heating.

What follows is a summary of the consultant's approach to the study, the methods of analysis and the major findings.

MAJOR FINDINGS

The purpose of the report was to examine the structural qualities and maintenance aspects of mobile homes in Ontario. Conventional housing was used as a bench-mark where necessary. The major findings of the report are summarized below.

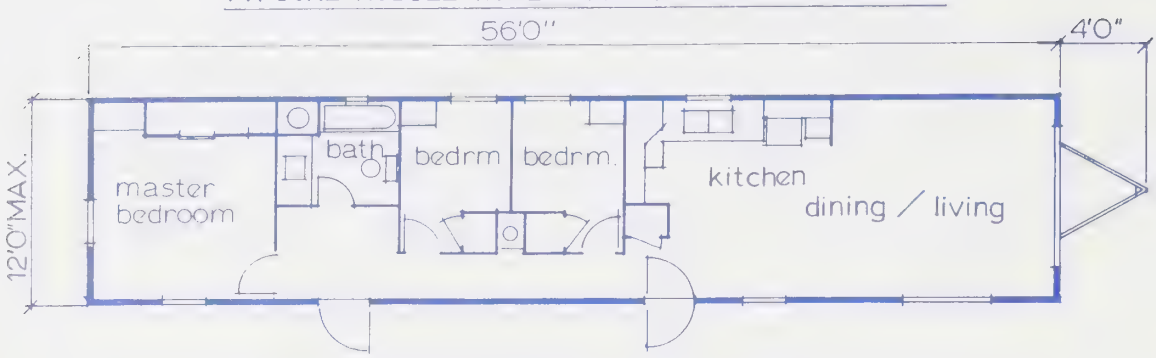
- The "typical" mobile home in Ontario is considerably less spacious than the minimum conventionally-built three-bedroom bungalow.
- Structural performance and fire safety are rated lower for the mobile home than for the conventionally-built house but this lower rating does not suggest that the mobile home is hazardous.
- The mobile home is subject to overturning in high gust winds, so it should be anchored securely.
- Thermal performance is similar in the mobile home and conventional bungalow, but the mobile home can be heated for less due to its smaller volume and surface area.
- Acoustics are rated lower in the mobile home, i.e. external airborne and impact noise and internal noise is greater.
- Maintenance tasks for the mobile home tend to be smaller and less costly than for the conventional bungalow.

- The Canadian Standards Association's standards for mobile home construction in Canada are less complete and less stringent than the provisions in the *National Building Code* for conventional dwellings.
- Inspection of mobile homes is easier due to concentration of production at relatively few manufacturing plants. Other dwellings require on-site inspection at many, scattered locations.
- The total initial cost of a mobile home, excluding land, is less than the cost of a conventional dwelling. This is not due to construction economies from factory production but is simply related to the smaller size of the mobile home.
- The cost per square foot of living space is similar for the mobile home and the conventional dwelling.

In summary, the mobile home in comparison with the conventional house offers less space, in a lower quality dwelling unit, but at a lower initial cost and with prospects for lower maintenance costs.

FIGURE 1

TYPICAL MOBILE HOME MANUFACTURED IN ONTARIO



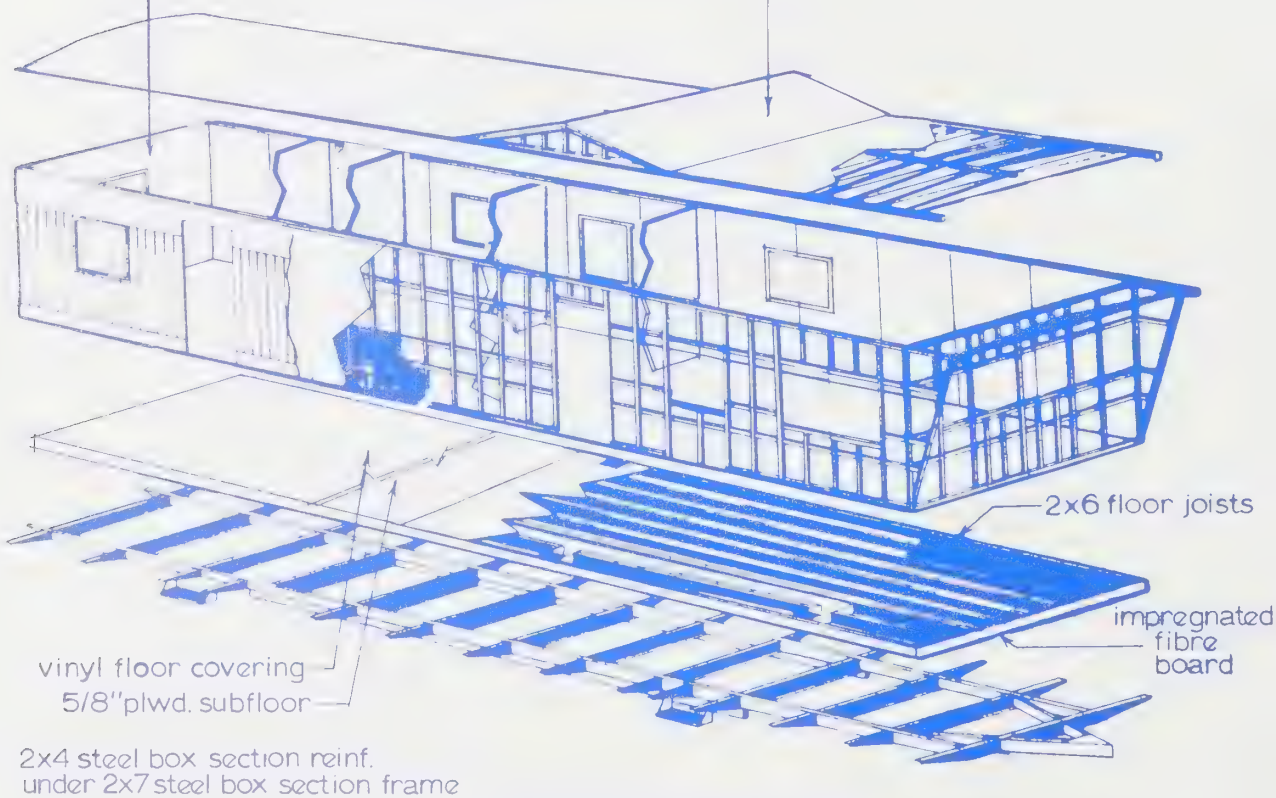
LAYOUT

12'x60', 3 BEDROOM—CENTRE KITCHEN

NOTE: 60' DIMENSION INCLUDES TOW BAR

WALLS 2x3 wall studs
aluminum siding
fome cor longboard sheathing
glass fibre insulation
prefinished plwd. interior panels
interior partitions:
2x2 studs
prefinished plwd. panels

ROOF metal roof (3 joins)
impregnated fibreboard insul.
glass fibre insul.
bowstring truss
prefinished fibreboard ceiling



CONSTRUCTION FEATURES

THE APPROACH

The study covered the physical and relevant economic aspects of the mobile home unit itself. Specifically, it concentrated on five areas, three concerned with the construction of the unit and two with certain cost aspects:

1. Standards of construction quality, environment, and space.
2. Durability.
3. Standards and codes governing manufacture.
4. Overall purchase price.
5. Occupancy costs related to construction of the unit.

METHODOLOGY

Since the 12 x 60-ft. (including tow bar) three-bedroom mobile home is by far the most common unit currently sold in Ontario (about 70 percent of all mobile home sales), the detailed analyses dealt exclusively with this type of unit (Figure 1).

To better appreciate results of the research on mobile home units, corresponding analyses were prepared for the smallest conventionally-constructed bungalow built under government-assisted housing programs in Ontario.

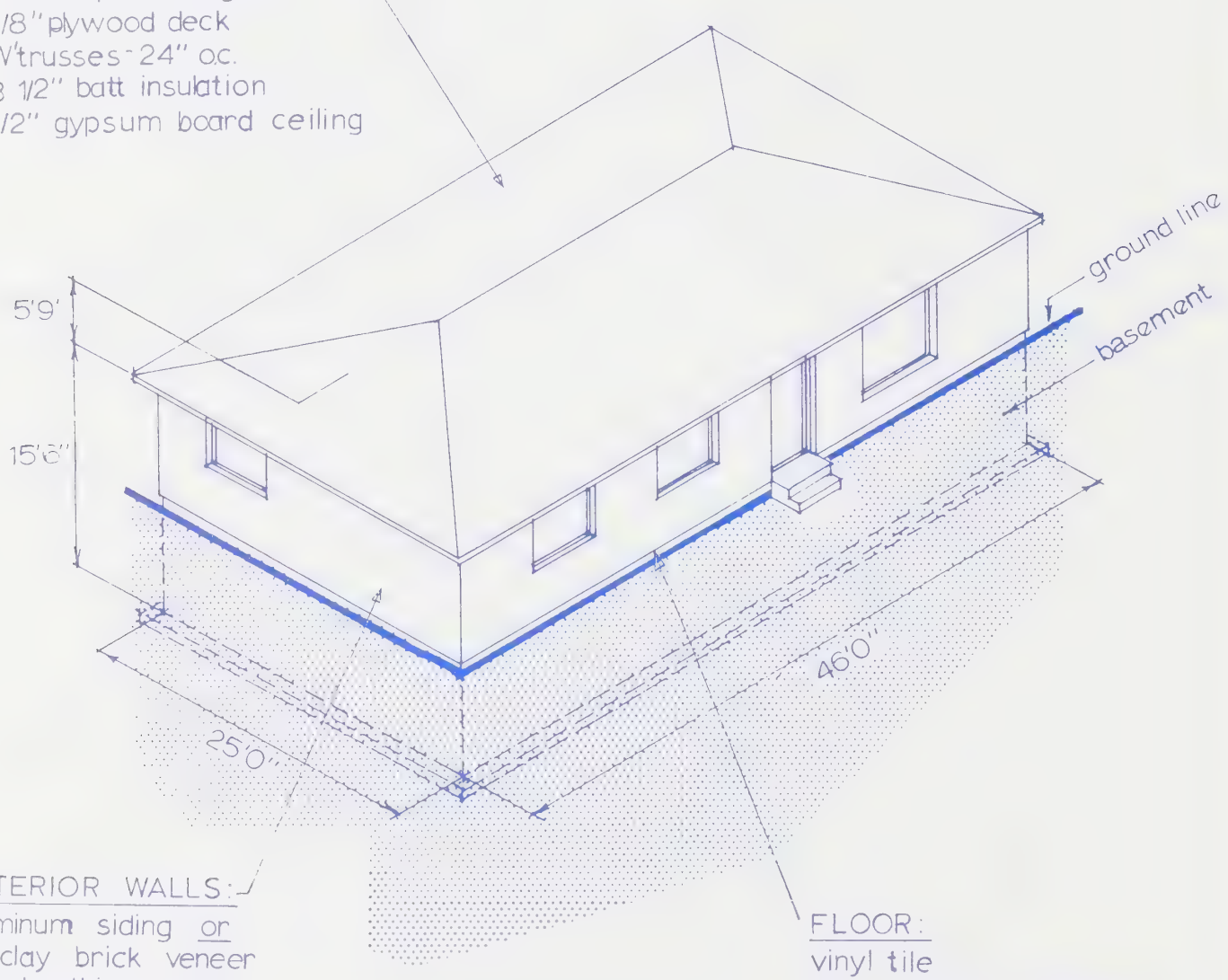
In terms of construction standards, space provision (1,000-1,100 sq.ft.) and costs, this bungalow would be the minimum commonly-built unit in the province, with construction characteristics and exposure conditions similar to the mobile home (Figure 2).

FIGURE 2

BUNGALOW

MAIN DIMENSIONS AND CONSTRUCTION

ROOF:
210 # asphalt shingles
3/8" plywood deck
W'trusses 24" o.c.
3 1/2" batt insulation
1/2" gypsum board ceiling



EXTERIOR WALLS:
aluminum siding or
4" clay brick veneer
12# sheathing paper
7/16" fibreboard sheathing
2x4 studs 16" o.c.
3 1/2" batt insulation
1/2" gypsum board

PARTITIONS:
2x3 studs 16" o.c.
1/2" gypsum board

FLOOR:
vinyl tile
1/2" plywood subfloor
2x8 joists 16" o.c.
I beam on 3" steel columns
2x4 sill
1/2" dia. anchor bolts 8'-0" o.c.

The study was divided into two parts, the first dealing with the research into the *construction* of the unit and the second with *costs*. The methodology used is described here.

Construction

This part of the study examined the performance of the typical mobile home under working conditions, the resistance of mobile home components to physical deterioration and, finally, the standards governing its construction.

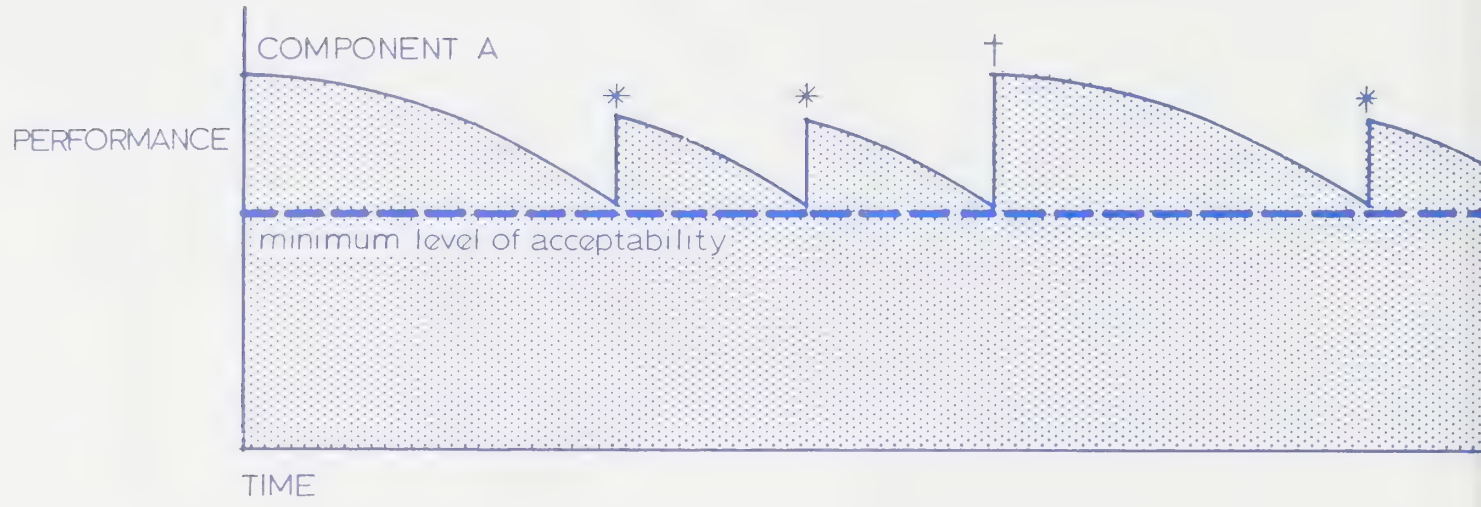
Performance: This section was concerned with how well the various components of a mobile home carry out their functions. A technical description of the materials and fabrication of a typical 12 x 60-ft. three-bedroom mobile home was prepared from an analysis of construction drawings supplied by each of the six major Ontario manufacturers. This description was then reviewed by the manufacturers who agreed that it was representative of current practice.

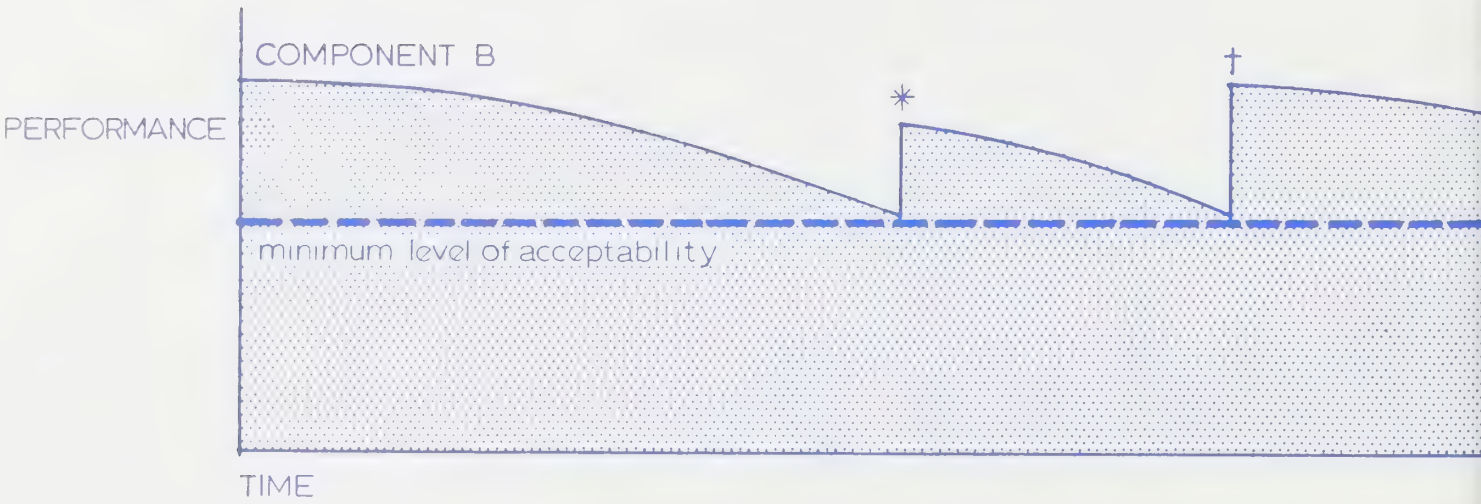
A similar description of a typical three-bedroom bungalow was prepared from site visits and from consultations with staff of the Ontario Housing Corporation and Central Mortgage and Housing Corporation familiar with southern Ontario construction practice.

Using these descriptions of the typical units, technical analyses were then prepared on layout and space provision, thermal, acoustic, structural and fire performance and several other aspects of performance with the assistance of experts in these particular fields.

FIGURE 3

REPAIR AND REPLACEMENT CYCLES FOR DIFFERENT ELEMENTS





† replacement

* repair

Durability: For study purposes, durability was defined as the ability of the mobile home and its components to resist physical deterioration.

Deterioration is caused by atmospheric and climatic action, impact and vibration, wear and abrasion, chemical action, and accidental and other causes. The overall deterioration rate depends upon construction methods and materials, level of maintenance, occupancy characteristics and nature of exposure.

Individual building components deteriorate at different rates and regular repair and replacement of deteriorated elements can extend a building's life indefinitely (Figure 3). Thus, a measure of the durability of components is the frequency with which repair and replacement takes place under normal conditions of exposure and occupancy.

The approach used was to carry out a survey of five large southern Ontario mobile home parks containing over 800 units to determine the type of deterioration and the nature and frequency of repair and replacement for major components. Similar maintenance information was gathered on over 1,000 public-housing single-family homes in southern Ontario and supplemented by data on a further 3,000 units managed by local housing authorities.

Standards and codes: The Canadian Standards Association's *Preliminary Standard Z240 for Mobile Homes* is a voluntary standard for Canada and has been adopted by the Ontario manufacturers interviewed. Part 9 of the *National Building Code*

1970, as amended, applies to low-rise residential construction in the province. The study examined how these standards were developed, their underlying philosophy and enforcement procedures. Their general differences were identified and a detailed comparison was made of the more important sections of the two codes.

Costs

This part of the study determined the overall price of a typical 12 x 60-ft. three-bedroom unit currently sold in Ontario, including purchase, transportation and siting. Operating costs directly attributable to the unit's construction, including maintenance, insurance and heating, were also determined.

Overall price: Characteristics of current mobile home models, their purchase prices and typical siting expenses were determined from a survey of the six manufacturers and twelve dealers in central and southern Ontario. Transportation rates and retail sales tax interpretations were obtained from the appropriate Ontario government agencies. Comparable information on new bungalow costs was determined from interviews with eight CMHC offices in the province and through the Ontario Housing Corporation's appraisal, architectural, and legal departments.

Selected costs: Maintenance costs were developed by using the repair and replacement frequencies for components -- determined in the earlier part of the study on durability -- and then consulting eight Ontario contractors experienced in mobile home repair

work for quotations on maintenance items. Similar quotations for bungalow costs were obtained from a further twelve small contractors. Heating costs were arrived at using the results of earlier calculations on the thermal performance of the units and the efficiency and fuel costs for the furnaces. Finally, insurance premiums were obtained from companies currently writing insurance for both mobile homes and bungalows.

TABLE 1

COMPARISON OF AREAS

	MOBILE HOME	BUNGALOW	
AREA *(sq.ft.)*			
LIVING	147	195	
DINING	-	100	
KITCHEN/DINING	132	120	
BATHROOM	38	50	
MASTER BEDROOM	98	135	
BEDROOM #2	51	110	
BEDROOM #3	51	85	
CIRCULATION SPACE	55	135	
LAUNDRY, FURNACE, HOT WATER TANK	30		(in basement)
CLOSETS	31	75	
PLAN AREA OF PARTITIONS	17	45	(includes 4 sq.ft. for chimney)
OVERALL GROUND FLOOR *(sq.ft. inside exterior walls)*	650	1050	
BASEMENT *(sq.ft. inside foundation walls)*	-	1050	
VOLUME *(cu.ft.)*			
GROUND FLOOR CLOSETS	220	560	
TOTAL BUILDING	4410	7800	(ground floor volume)
		8400	(basement volume)

1. THE FINDINGS: CONSTRUCTION

Results on construction are discussed here under the headings of Performance, Durability, and Standards and Codes.

PERFORMANCE

Performance investigations relate to the *actual* ability of building elements to carry out their functions as compared to the *minimum* requirements established or implied by a building code. Areas of performance studied included:

Space and Layout

Comparisons of space provision and layout reveal the most significant performance differences between these two shelter types. Investigations focused on five aspects:

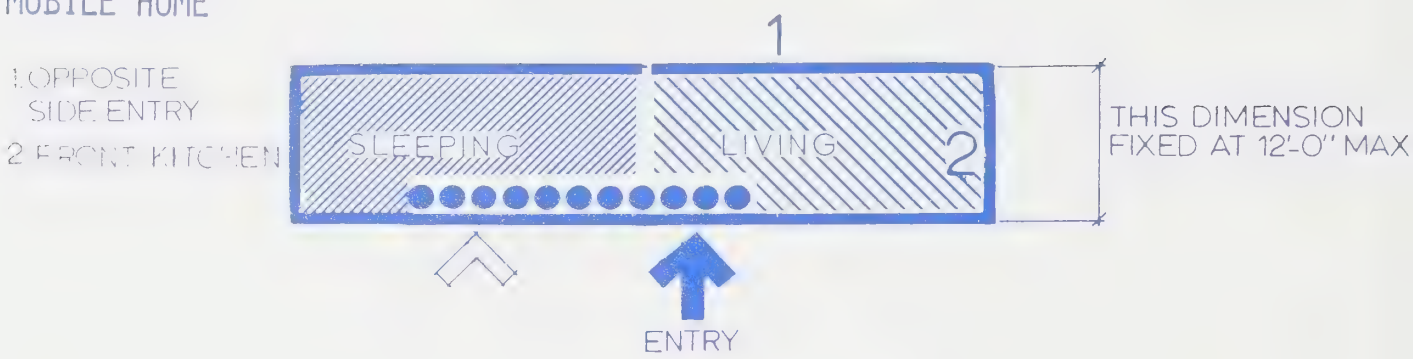
a) *Space:* Mobile home rooms are 25 to 65 percent smaller than those in the bungalow and the ground floor area is 40 percent less (Table 1). The mobile home has 60 percent less closet space and no interior space for storage of large items such as those normally stored in a basement. The furnace, hot water tank and laundry facilities must be placed on the ground floor area of the mobile home, further reducing living space.

b) *Plan layout possibilities:* The mobile home's width permits only a linear relationship between living (kitchen, living, dining) and sleeping areas (Figure 4). The comparative lack of restrictions on the bungalow shape allows four basic relationships of living and sleeping zones in terms of circulation

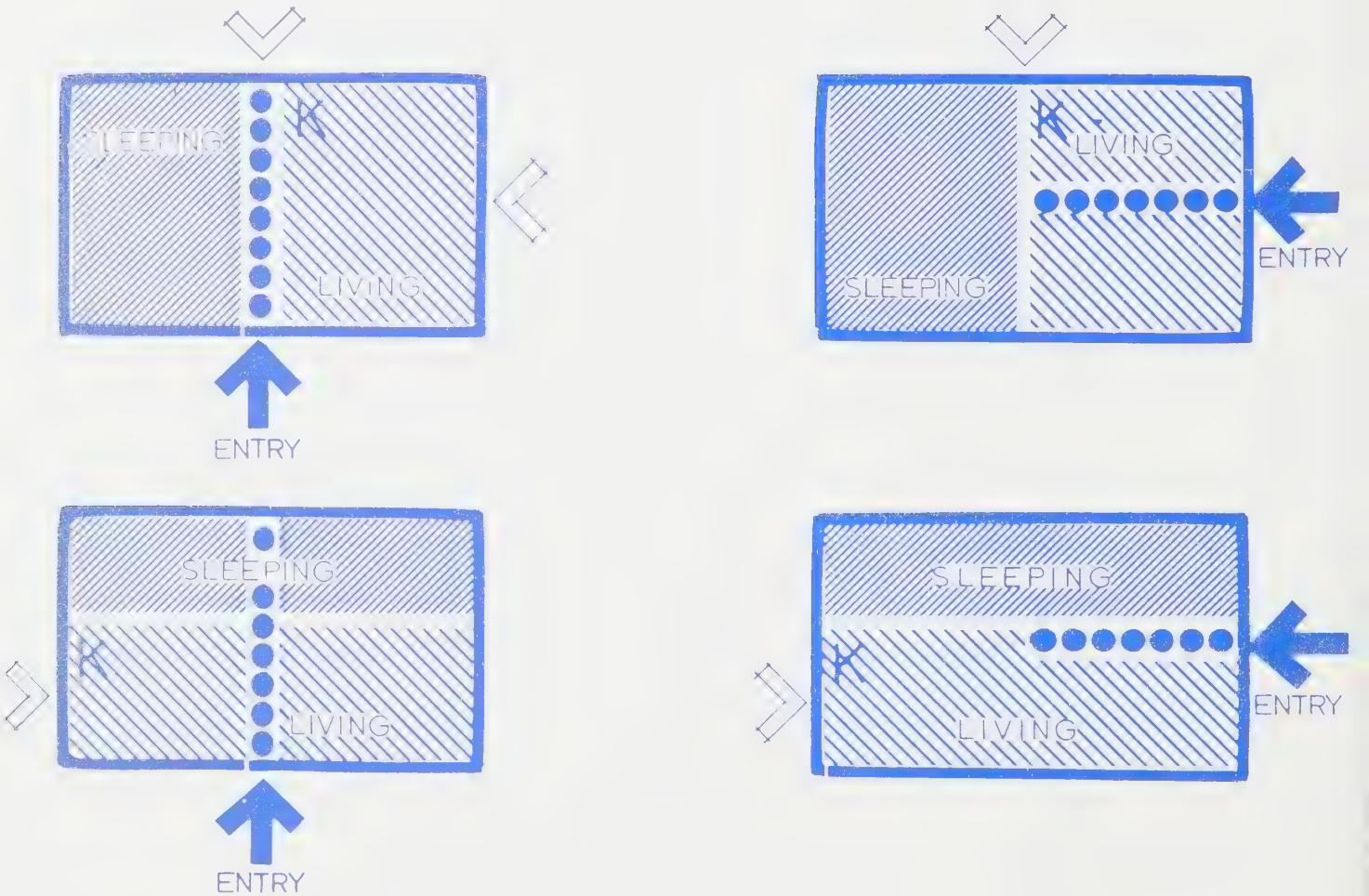
FIGURE 4

VARIATIONS IN PLAN LAYOUT

MOBILE HOME



BUNGALOW



K KITCHEN

SECOND ENTRY

CIRCULATION

and, within these zones, a wide variety of room arrangements is possible. (Figure 4) Another disadvantage in the plan layout of a mobile home occurs at the entry which, unless specifically modified, usually opens directly into either the kitchen, dining or living area. Bungalow layout commonly provides a vestibule and a hall leading to other rooms.

c) *Flexibility in space use:* There is only one dining area in the mobile home as opposed to two (kitchen and dining room) in the bungalow. Open planning reduces privacy desirable for using the mobile home living room to accommodate overnight guests. The lack of variety in size of mobile home bedrooms, together with their minimum floor area, limits their use as a place for such pastimes as hobbies, sewing, studying and games. In contrast, the bungalow has at least one secondary bedroom with space for a desk or sewing table that would not interfere with its normal sleeping and dressing function.

d) *Facilities for small children:* Only the mobile home living/dining area is large enough for a baby's playpen and this would greatly infringe on the usable space of this area. In the bungalow, a playpen could be placed in the second or third bedroom or in the living/dining area without interfering greatly with the daytime use of the unit. The basic mobile home also does not provide space for a "mudroom" whereas the bungalow usually provides a rear entrance off the kitchen where children's coats and rubbers may be put on and taken off, and toys stored.

e) *Housework:* Cleaning the mobile home means less effort than for the bungalow because of the former's smaller floor, wall and ceiling area. Yet the smaller area may result in more concentrated wear of materials and cause greater congestion during cleaning. Having the washer and dryer on the main floor in the mobile home eliminates walking up and down basement steps.

Thermal Performance

For both shelter types, thermal performance investigation showed similar characteristics but the smaller volume and surface area of the mobile home considerably reduce its winter heat requirements.

a) *Insulation values:* Although there are no significant differences in thermal performance of the walls, floor and roof of the two units, the underside of the mobile home floor is exposed to the weather whereas the bungalow is protected by the basement.

b) *Rate of infiltration:* The rate of infiltration in the mobile home is about 60 percent higher due to its smaller volume and greater total perimeter of door and window cracks.

c) *Heat loss:* Considering differences in insulation and infiltration, the overall mobile home heat loss is 30 percent less than that of the bungalow and therefore the total winter heat requirement would also be 30 percent less.

d) *Extent of thermal movement:* Calculations indicate that the structure of the mobile home would be subject to slightly higher working stresses due to potentially greater thermal movement of cladding (assuming the bungalow is also aluminum clad).

Acoustic Performance

Comparative acoustic analyses indicate mobile home performance to be lower than that of the bungalow.

a) *Ceiling and roof:* Due to lighter roof covering, smaller air space and closer coupling between the ceiling and roof skin, a given overhead airborne sound will appear about 40 percent louder in the mobile home than in the bungalow.

b) *Floor:* The mobile home is more susceptible to exterior sound striking the underside of the floor because it has no foundation walls or basement to shield it.

c) *Exterior walls and windows:* Due to lighter structure and sheathing, the mobile home exterior walls with all windows closed will transmit a given sound 50 to 60 percent louder than will the bungalow walls. The impact noise ratio is similar for the two shelter types if aluminum sheathing is used, but it is less for the bungalow if brick veneer is used as cladding.

d) *Partitions and plan layout:* A given sound will appear 20 to 25 percent louder through partitions in the mobile home due to lighter construction. Plan layout in each shelter type results in similar relationships for quiet and noisy areas, but the location of the washer, dryer and furnace in the mobile home is not

as good acoustically as it is in the bungalow where they are more remotely located in the basement.

Structural Performance

Structural analyses indicate that the generally lighter construction of the mobile home results in slightly lower performance.

a) *Roof:* Calculations, not considering composite action of sheathing and cladding, indicate over-stress and excessive deflections in the mobile home roof at loads of 40 lbs. per sq.ft. Under actual loading conditions, composite action reduces stress and deflections to acceptable limits. But the bungalow roof structure remains the stronger and stiffer of the two.

b) *Walls:* Studs with smaller cross sections result in the mobile home walls providing only about 55 percent of the load capacity of the bungalow walls for axial and lateral loads.

c) *Floors:* Heavier floor construction (to overcome stresses in transit) provides the mobile home with a stiffer floor system resulting in vibrations having a smaller displacement and thus being less noticeable.

d) *Superstructure anchorage:* The walls of both shelter units can withstand wind speeds greater than those which are necessary to cause damage to other parts of the structure, but the mobile home, if not anchored, may tip at gust speeds above 80 mph which are occasionally found in parts of Ontario.

Fire Safety

Investigations into fire safety concentrated on fire ratings (the higher the better) as well as on flame spread and smoke ratings (the lower the better) for the roof/ceiling system and wall system. Ease of emergency exit was also considered.

Roof and ceiling system: The fire rating of the mobile home ceiling system is lower or equal to that of the bungalow. The mobile home ceiling has a considerably higher flame spread and smoke rating than the bungalow, mainly due to the use of prefinished fibreboard in the former as opposed to gypsum board panels in the latter.

Wall system: The fire rating for the mobile home wall system is considerably below that for the bungalow due to the former's lighter construction. Flame spread and smoke ratings for the plywood mobile home walls are also inferior to those for the gypsum board walls in the bungalow.

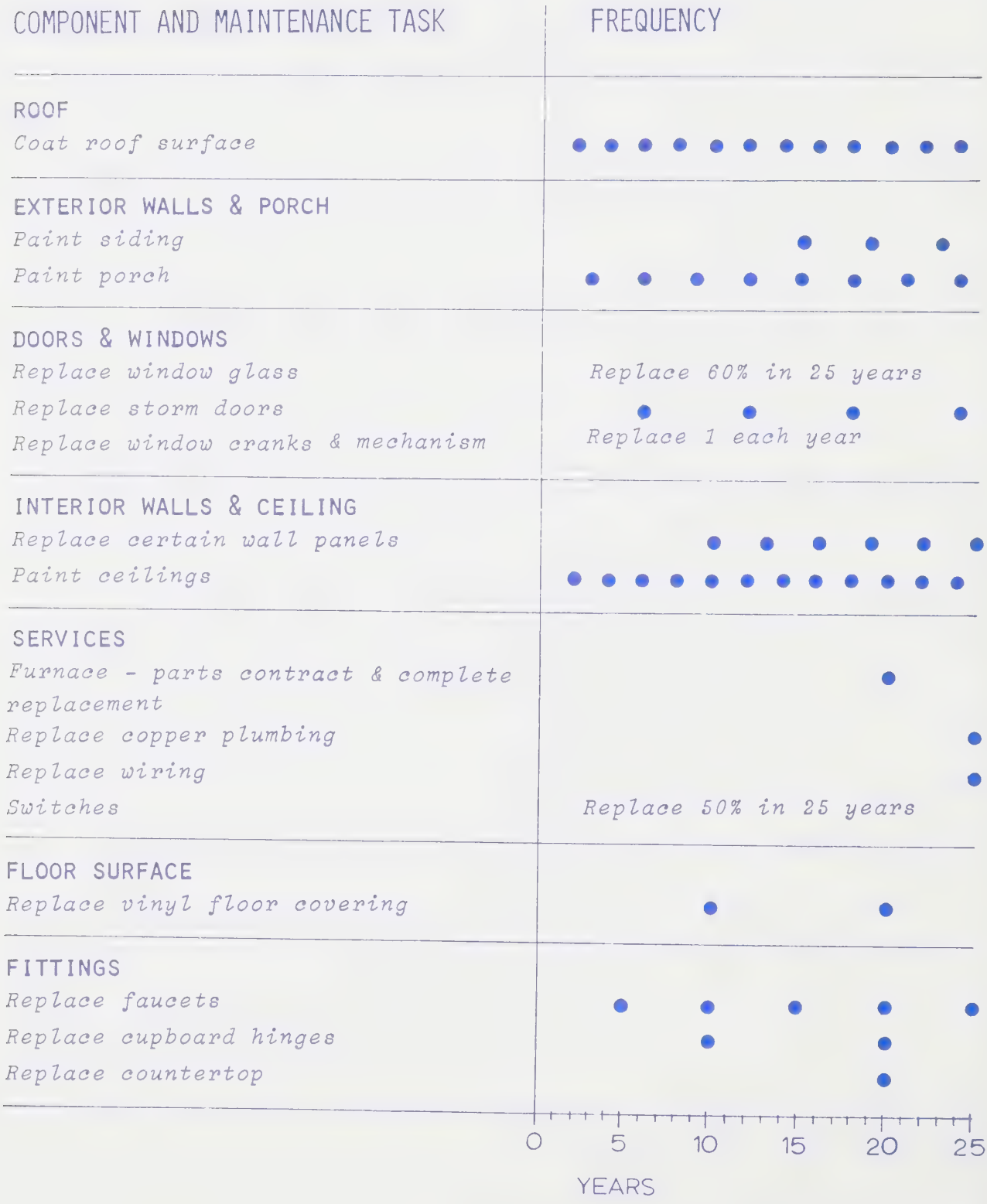
Emergency Exit: Emergency exit in the mobile home is not as convenient because some owners do not provide steps to the ground at the secondary exit, and the smaller panes of glass set in aluminum mullions (to reduce breakage in transit) would hinder escape through the windows.

Other Aspects of Performance

Investigations into five secondary areas of performance yielded these results:

FIGURE 5

REPAIR AND REPLACEMENT FREQUENCIES- MOBILE HOME COMPONENTS



Lighting: Mobile home glass area is greater than that for the bungalow and its narrower width permits a greater amount of natural light to enter. Provision for electrical lighting is similar in both shelter types.

Water exclusion: The mobile home is not susceptible to upward water seepage because the only interface between the substructure (concrete block piers) and the unit is the steel chassis members. But its exterior walls do not contain sheathing paper for added protection against wind-driven rain.

Protection against vermin infestation: Controlled materials storage, factory production, minimal contact with the ground, the sealed underside and metal-framed openings give the mobile home better protection against attack by common vermin.

Expandability: The mobile home lacks a basement for expanding living space within the structure but can be expanded laterally.

Appearance: The mobile home shape, as well as choice of interior and exterior materials, is limited compared to the bungalow.

DURABILITY

The mobile home and the bungalow have similar repair and replacement cycles for many elements including mechanical and electrical services, floor surfaces, fittings and doors and windows. Thus the conclusion can be drawn that these elements have similar durability qualities for both shelter types. (Figures 5 and 6)

FIGURE 6

REPAIR AND REPLACEMENT FREQUENCIES
BUNGALOW COMPONENTS

Yet there are some marked differences in maintenance frequencies for certain elements. The mobile home roof requires small biennial preventative maintenance tasks capable of being done by the owner, whereas the asphalt shingles on the bungalow require professional patching after about 10 years and complete replacement after about 19 years.

The interior walls of the mobile home begin to require replacement after about 10 years and those areas having the greatest wear require replacement of certain panels at three-year intervals. Bungalow walls do not require replacement but do require regular painting every three years.

The exterior siding of the mobile home is somewhat less durable, requiring earlier repair than the bungalow with aluminum siding, and much earlier treatment than the brick veneer bungalow.

An indirect measure of durability of the dwelling unit as a whole, as opposed to individual elements, can be obtained by determining the total cost of all the maintenance tasks described here over given time periods. These costs have been estimated and are shown in the section on maintenance costs.

STANDARDS AND CODES

The study investigated standards governing construction of mobile homes and conventional houses to provide a comparison of minimum construction quality.

Two Main Codes

Mobile home construction in Canada is guided by the Canadian Standards Association's *Preliminary Standard Z240*. Members of the Canadian Standards Association

sub-committee on mobile homes included representatives from mobile home manufacturers, suppliers and dealers, as well as from certain federal and provincial government agencies. The Z240 series has several sections covering definitions, vehicular requirements, structure, plumbing, oil heating, gas heating and electrical services.

Manufacturers wishing to have their units certified apply to CSA whose inspectors examine specifications for each model, test various aspects of structure and services and, if the model meets all requirements, CSA issues certification labels that may be attached to all production runs of that model.

Spot checks in factories by CSA staff ensure continued adherence to the Standard. Violation can result in recall of mobile home units -- even suspension of certification.

House construction in Ontario falls within the scope of Part 9 of the *National Building Code of Canada*, 1970, as amended. This Code is meant to provide a minimum standard for all low-rise, year-round housing including that financed under the *National Housing Act*. The NBC covers most aspects of house construction, including minimum space requirements, and refers to established standards for materials.

The overall purpose of the NBC, whose contents are under continual review, is to assist municipalities in adopting building by-laws to guide new construction under their jurisdiction. Where the municipality has adopted the NBC as a building by-law, permission to build can be withheld if drawings and specifications do not meet Code requirements.

General Differences and Omissions

CSA Z240 and NBC Part 9 differ in three main aspects: in scope and application; in method of enforcement and legal status; and in the standard and detail of construction requirements.

First, CSA Z240 was developed to cover only one type of permanent shelter -- the mobile home. The variations possible in this one shelter type are only a small fraction of those possible in conventional construction. Moreover, most mobile homes in Canada are constructed by a small number of manufacturers located in a few cities. Fabrication can be easily monitored by the small group of CSA officials who thoroughly understand the limited variety of methods and materials used in construction.

On the other hand, NBC Part 9 deals with the whole range of conventional low-rise housing types designed and built across Canada, under varying siting, climatic and economic conditions, by designers and builders with different backgrounds and experience. Moreover, NBC must be administered by local officials with various degrees of competence and experience, who are responsible for municipalities with different concerns and expectations.

NBC is also formulated to take into account differences in site conditions whereas CSA Z240 generally assumes constant conditions. While there are some provisions in CSA Z240 to allow for unusual local conditions, the mobility of the units means that there is no guarantee that all units located in areas where those special conditions apply will have such variations -- extra insulation, say -- incorporated.

A second difference lies in the method of enforcement and legal status of the two documents. When adopted by a municipality, the *National Building Code* forms the basis of a building by-law which requires strict adherence to its clauses and provisions as applied by the local building department and its inspectors. While *The Planning Act*, Ontario, as amended to September 1971, indicates that by-laws may also contain CSA Standards where deemed necessary to maintain certain levels of performance or quality, adherence to the *CSA Z240 Preliminary Standard* is at present strictly voluntary and, at present, is not cited in any building by-law in Ontario.

The third major difference relates, in part, to the first. As a result of its narrower scope and more direct implementation, CSA Z240 provides much less detailed information, requiring CSA officials to use the more general clauses in evaluating a particular model. In addition to this, and not directly related to differences in scope and application, the Z240 requirements are less stringent and this has important implications for construction quality. Detailed differences in the two sets of regulations, although of interest, are not important -- especially in view of proposed changes to both which will likely resolve some of these differences.

2. THE FINDINGS: COSTS

The results of cost investigations are discussed here under the headings Overall Price and Selected Maintenance and Operating Costs.

OVERALL PRICE

Prices for both shelter units are not strictly comparable because of the different aspects included. The study identified these aspects to get a better understanding of the basic price.

Mobile Home

The mobile home overall price includes retail purchase price, retail sales tax and costs for transportation, set-up, steps and skirting. The retail purchase price usually includes furniture, a range, refrigerator, drapes and floor coverings; but if these items are not required there is a reduction allowed. Investigations indicate that the range of retail prices for mobile homes could be reduced to three main categories:

Economy from $8,000 to $9,500, less from $300 to $500 if furniture not taken and less a further $200 if appliances not included.
Middle from $9,500 to $11,000, less $500 to $700 without furniture and $250 without appliances.
Deluxe from $11,000 to $13,000, less $700 to $1,500 without furniture and $300 without appliances.

The prices vary depending on materials. They do not include transportation beyond the distance allowed by the dealer nor do they include set-up, steps and skirting, or retail sales tax.

TABLE 2

EXAMPLE OF HAULAGE RATES FOR MOBILE HOMES*

MILES HAULED	CHARGE
0 - 10	$ 40
11 - 25	52
26 - 50	64
51 - 75	76
76 - 100	88
101 - 125	100
126 - 150	112
151 - 175	124
176 - 200	136
201 - 225	148
226 - 250	160
251 - 275	173
276 - 300	186

Over 300 : rate per mile 62¢

* *Typical schedule of charges for a carrier transporting 12'x60' mobile homes in Ontario (75). Rates vary somewhat according to season and roads being traversed.*

The 5 percent Ontario retail sales tax is payable on the full purchase price if the unit is not installed on its pad, or is payable on the dealer's cost price if the unit is bought connected to services.

Transportation distances covered in the retail purchase price vary, depending on the dealer, the season, and the roads travelled (See Table 2).

Set-up or siting costs include connection of services consisting of electrical power, water, sewage, fuel oil (if this is used for heating) and gas (if this is used for cooking). These costs are usually around $175 to $250 but may be included in the overall price.

The installation of skirting, which is required by some mobile home parks together with steps, varies in cost from about $125 to $300.

If one were to purchase an unfurnished $10,000 mobile home, connected to services,taking all the above costs into consideration and assuming an average figure where price and cost ranges have been given, the price for a 12 x 60-ft. mobile home would be:

Mobile home (12 x 60-ft.) 3 bedroom	$10,000
Set-up costs	175
Retail sales tax - 5% on $8,000 (assuming dealer's mark-up of 25%)	400
Skirting & steps	225
Overall cost ready for occupancy	$10,800

Conventional Bungalow

A survey of CMHC offices around the province indicated the construction cost of a conventional bungalow of about 1,000-1,100 sq.ft. in early 1972 to be between $15 and $18 per sq.ft. of living area. (Toronto, $15.50; Kitchener, $16; Sudbury $18).

TABLE 3

OVERALL PURCHASE PRICES

MOBILE HOME

ITEM	ECONOMY CLASS	LUXURY CLASS
Mobile home 12'x60' 3-bedroom	$8,000	$13,000
Less: Furniture allowance*	400	1,100
Appliance allowance	200	300
Mobile home, unfurnished	$7,400	$11,600
Retail Sales Tax - 5%**	370	580
Set-up*	175	250
Skirting & steps*	125	300
TOTAL PRICE	$8,070	$12,730
Price per square foot (650)***	$12.42	$19.58
Price per cubic foot (4550)***	$1.77	$2.79

CONVENTIONAL CMHC BUNGALOW

ITEM	LOW	HIGH
1050 square foot bungalow	$15,000	$18,900
1% mortgage fee	150	189
Solicitor's fee*	240	260
Insurance*	75	80
TOTAL PRICE	$15,465	$19,429
Price per square foot (1050)***	$14.70	$18.50
Price per cubic foot (7875) ***	$1.96	$2.46

* *Approximate according to the range given*

** *Assuming this as tangible personal property*

*** *Note that the per square and cubic foot prices have been determined by dividing the total purchase price by the living area or volume of the unit. While the bungalow prices include the basement, the area or volume of the basement has not been included in the calculations since this space is assumed to be used for storage only and requires additional expense to make it livable.*

Information from the Ontario Housing Corporation appraisal department on construction costs of the H.O.M.E. (Home Ownership Made Easy) bungalows indicates a range in cost for typical projects completed in late 1971 and early 1972 of $14 to $15 per sq.ft. (Costs are not permitted to exceed $15,000 on a three-bedroom bungalow).

In addition to the basic purchase price, other costs are incurred by the purchaser. For a normal NHA bungalow, he would pay the solicitor's fee for title search and transfer, and a CMHC fee guaranteeing the mortgage.

Overall prices for both the mobile home and the bungalow are summarized in Table 3.

SELECTED MAINTENANCE AND OPERATING COSTS

Investigations showed significant differences when comparing various operating costs directly related to the physical construction of the mobile home and bungalow.

Maintenance

Conventional bungalow maintenance costs are somewhat higher than those for a mobile home. Examination of Tables 4 and 5 indicates that this is mainly due to the need to paint the interior of the conventional bungalow more frequently than the mobile home, and to the greater costs involved in repairing or replacing major items in the bungalow such as roofing, floor covering, plumbing and wiring.

TABLE 4

MAINTENANCE COST - MOBILE HOME COMPONENTS

(CONSTANT 1972 DOLLARS)

COMPONENT & MAINTENANCE TASK	FREQUENCY & COST																								
YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ROOF																									
Coat roof surface		30		30		30		30		30		30		30		30		30		30		30		30	
EXTERIOR WALLS & PORCH																									
Paint siding															225				225				225		
Paint porch			30			30			30			30			30			30			30			30	
DOORS & WINDOW																									
				25				25				25				25				25				25	
						50						50						50						50	
tem	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
INTERIOR WALLS & CEILING																									
Replace certain wall panels										150			150			150			150			150			150
Paint ceilings		80		80		80		80		80		80		80		80		80		80		80		80	
SERVICES																									
	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	566	16	16	16	16	16
																									300
																									1
					5					5					5					5					5
FLOOR SURFACE																									
Replace vinyl floor covering										650										650					
FITTINGS																									
Replace faucets					90					90					90					90					90
Replace cupboard hinges										60										60					
Replace countertop																				100					
	21	131	51	156	116	211	21	156	51	1086	21	236	171	131	371	306	21	211	396	1611	51	281	246	236	991

TABLE 5

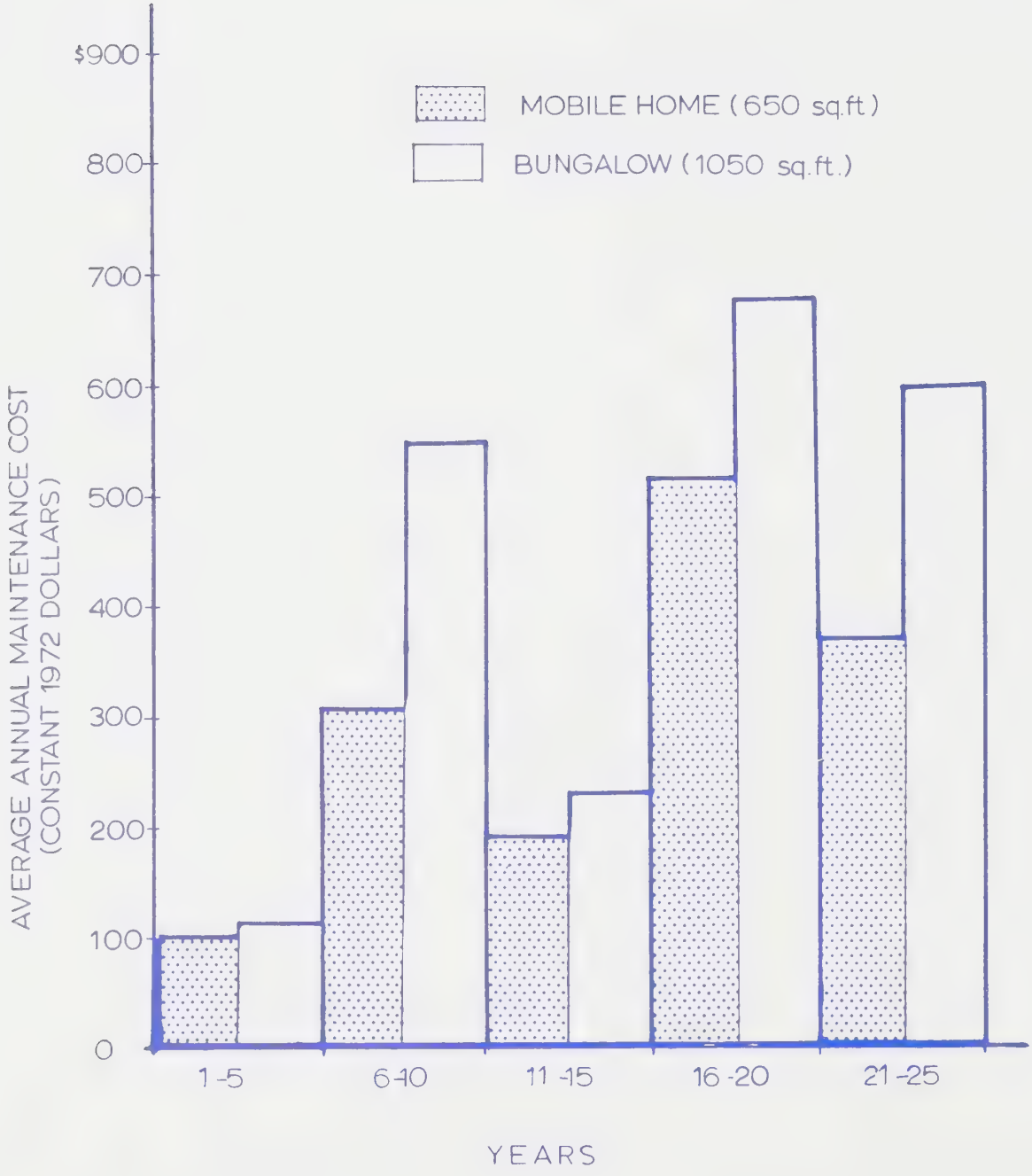
MAINTENANCE COST-BUNGALOW COMPONENTS

(CONSTANT 1972 DOLLARS)

COMPONENT & MAINTENANCE TASK	FREQUENCY & COST																								
YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ROOF																									
[illegible]										31		31			31			31							
[illegible]																			344						
Repair and repaint eaves troughs			100			100			100			100			100			100			100				
EXTERIOR WALLS & PORCH																									
Refinish aluminum siding																							270		
[illegible] or brick wall on weather side																				164					
Rebuild porch									144									144							
Repaint porch & eaves			109			109			109			109			109			109			109			109	
DOORS & WINDOWS																									
[illegible]ace aluminum storm doors								86								86								86	
Replace window glass			25			25			25			25			[illegible]			25			25			25	
INTERIOR WALLS & CEILINGS																									
Patch and repaint			[illegible]			270			270			270			[illegible]			270			270			[illegible]	
SERVICES																									
Furnace - parts contract & complete replacement	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	566	16	16	16	16	16
Replace copper plum[illegible]																									[illegible]
FLOOR SURFACE																									
Replace vinyl tile										1050															
FITTINGS																									
Replace faucets								100								100								100	
Replace cupboard hinges										100										100					
[illegible]																				[illegible]					
	[illegible]	16	520	16	[illegible]	[illegible]	16	202	664	1202	16	551	16	16	556	202	16	[illegible]9	360	2020	[illegible]	16	286	706	1415

FIGURE 7

AVERAGE ANNUAL MAINTENANCE COSTS



Clearly, the smaller size of the mobile home accounts for the lower costs of similar tasks such as exterior painting and floor covering. Because of the smaller size of the tasks in the mobile home, the owner may be more willing to do some of them himself and this would reduce the costs shown. Figure 7 shows the extent of the cost differences by presenting annual maintenance costs averaged over five-year periods.

Insurance and Heating

The insurance costs obtained indicate that the mobile home premium of $146 is 38 percent higher than that for the bungalow for reasons of construction and of isolation from fire fighting equipment (Table 6).

The results of the study of heating costs show that, depending on location of the unit, annual heating cost for a typical three-bedroom mobile home can vary between $154 and $236, as compared with $211 to $332 for the three-bedroom bungalow. As mentioned earlier, the mobile home requires approximately 30 percent less heat to maintain its interior temperature at an acceptable level during the cold weather months as compared to the conventional bungalow.

TABLE 6

INSURANCE COSTS

ITEMS COVERED	MOBILE HOME	BUNGALOW
Purchase price (excluding land)	$10,000	$15,000
Contents	4,000	6,000
Theft off premises	1,500	1,500
Personal Liability	25,000	25,000
Living expenses	3,000	3,000
Premium for 3 years	$146	$118 Frame * $106 Brick *

* *Standard insurance premium for bungalow also includes coverage of outbuildings to 10% of bungalow purchase price (excluding land).*

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Organizations

Canadian Mobile Home and Travel Trailer Association

Canadian Standards Association

Manufacturers

Boise Cascade Mobile Homes
London, Ontario

Commodore Homes
Preston, Ontario

Custom Trailer Limited
Exeter, Ontario

Glendale Mobile Homes
Strathroy, Ontario

Marlette Homes of Canada
Stratford, Ontario

Pyramid Mobile Homes
Windsor, Ontario

Government Agencies

Central Mortgage and Housing Corporation

National Research Council

Ontario Housing Corporation

CONSULTANTS

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Thermal Analysis:

H.H. Angus and Associates Limited
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Structural Analysis:

C.D. Carruthers & Wallace Consultants Ltd.
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Layout and Space Provision:

Jerome Markson Architects
Toronto, Ontario

Building Science:

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Acoustic Analysis:

Valcoustics Ltd.
Toronto, Ontario